

CLAIMS

What is claimed is:

1. A method of manufacturing phase-shifted masks, the method comprising the steps of:
providing, from a facilitator on behalf of a set of one or more parties that desire masks, subsidies for production of phase-shifted masks;
paying for manufacture of said phase-shifted masks using compensation that includes said subsidies from said facilitator;
causing a set of one or more mask makers to manufacture said phase-shifted masks for said compensation; and
receiving, by said facilitator from said set of one or more parties, compensation for said subsidies based on one or more factors including a factor that reflects market success of integrated circuits produced using said phase-shifted masks.
2. The method of Claim 1 wherein, for a particular party in said set of one or more parties,
the facilitator agrees to provide subsidies for production of phase-shifted masks for a defined population of designs; and
the particular party agrees to compensate the facilitator for the subsidies based on a factor that reflects market success of each and every integrated circuit produced by or for said particular party based on any design in said defined population of designs.
3. The method of Claim 1 wherein:
the phase-shifted masks include a phase-shifted mask for a particular design;
manufacture of a mask for said particular design using an alternative technology would cost X;

5 manufacture of the phase-shifted mask for the particular design costs Y, where Y is
6 greater than X; and
7 the step of providing subsidies includes providing a subsidy that is substantially equal
8 to Y-X for manufacture of said phase-shifted mask for said particular design.
9

1 4. The method of Claim 1 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator based on number of
3 integrated circuits manufactured using a phase-shifted mask that was subsidized by
4 the facilitator.

1 5. The method of Claim 1 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator for rental of a phase-
3 shifted mask that was subsidized by the facilitator.

1 6. The method of Claim 1 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator based on revenues
3 derived from integrated circuits manufactured using a phase-shifted mask that was
4 subsidized by the facilitator.

1 7. The method of Claim 6 wherein the party pays the facilitator a per-unit amount that
2 decreases with increased volume of sales of integrated circuits manufactured using
3 said phase-shifted mask.

1 8. The method of Claim 1 wherein the set of one or more parties includes a plurality of
2 parties.

1 9. The method of Claim 1 wherein the set of one or more mask makers includes a
2 plurality of mask makers.

- 1 10. The method of Claim 8 wherein the set of one or more mask makers includes a
2 plurality of mask makers.
- 1 11. The method of Claim 1 further comprising the step of the facilitator certifying mask
2 makers that satisfy certain quality criteria.
- 1 12. The method of Claim 1 further comprising the step of the facilitator selecting the one
2 or more mask makers to manufacture said phase-shifted masks.
- 1 13. The method of Claim 1 further comprising the step of the facilitator gathering
2 information about jobs performed by mask makers, wherein said one or more mask
3 makers are selected to manufacture said phase-shifted masks based on said
4 information.
- 1 14. The method of Claim 13 further comprising the step of the facilitator determining
2 which mask makers to certify based on said information.
- 1 15. The method of Claim 13 wherein the information includes information from the mask
2 makers about reticles that they produce.
- 1 16. The method of Claim 15 further comprising the step of the facilitator causing the
2 mask maker to encode information about a particular reticle onto the particular
3 reticle.
- 1 17. The method of Claim 1 further comprising the step of the facilitator performing one
2 or more quality assurance tests on said phase-shifted masks.
- 1 18. The method of Claim 17 wherein the step of performing one or more quality
2 assurance tests is performed for a given phase-shifted mask prior to the facilitator
3 releasing said given phase-shifted mask to be used by a semiconductor manufacturer.
- 1 19. The method of Claim 1 further including the facilitator using a stepper simulation tool
2 to determine which flaws in said phase-shifted masks have to be corrected.
- 1 20. The method of Claim 19 further comprising the steps of:

the facilitator providing information about a particular phase-shifted mask acquired through the use of the stepper simulation tool to a semiconductor manufacturer; and

the semiconductor manufacturer adjusting parameters on an actual stepper that is used with the particular phase-shifted mask based on the information.

21. The method of Claim 1 further comprising the step of the facilitator obtaining a volume discount from a mask manufacturer based on a contract in which the facilitator agrees to use the mask manufacturer to produce phase-shifted masks for a plurality of semiconductor manufacturers.
22. The method of Claim 1 further comprising the step of the facilitator purchasing an option from a mask maker that commits the mask maker to perform a certain volume of future work for the facilitator; and wherein the step of causing a set of one or more mask makers to manufacture said phase-shifted masks includes said facilitator exercising said option.
23. The method of Claim 1 wherein:
 - the compensation for said subsidies is based on the number of semiconductors produced by said phase-shifted masks; and
 - the method further comprises the steps of using a counter installed on stepper equipment to determine the compensation.
24. The method of Claim 1 wherein:
 - the compensation for said subsidies is based on the number of semiconductors produced by said phase-shifted masks; and
 - the method further comprises the steps of placing a counter device on at least one of the phase-shifted masks to determine the compensation.

1 25. The method of Claim 1 further comprising the step of facilitator causing designs of at
2 least some of the integrated circuits produced using said phase-shifted masks to be
3 watermarked.

1 26. A phase-shifted mask produced by a process that includes the steps of:
2 providing, by a facilitator on behalf of a party that desires a mask, a subsidy for
3 production of said phase-shifted mask;
4 paying for manufacture of said phase-shifted mask using compensation that includes
5 said subsidy from said facilitator;
6 causing a mask maker to manufacture said phase-shifted mask for said compensation;
7 and
8 receiving, by the facilitator from said party, compensation for said subsidy based on
9 one or more factors including a factor that reflects market success of
10 integrated circuits produced using said phase-shifted mask.

1 27. An integrated circuit produced by a process that includes the steps of:
2 providing, by a facilitator on behalf of a party, a subsidy for production of said phase-
3 shifted mask;
4 paying for manufacture of said phase-shifted mask using compensation that includes
5 said subsidy from said facilitator;
6 causing a mask maker to manufacture said phase-shifted mask for said compensation;
7 manufacturing said integrated circuit based on said phase-shifted mask; and
8 receiving, by the facilitator from said party, compensation for said subsidy based on
9 one or more factors including a factor that reflects market success of said
10 integrated circuit.

1 28. A method of manufacturing masks using a particular technology when said particular
2 technology is preferable to but cost more than one or more alternative technologies,
3 the method comprising the steps of:
4 providing, from a facilitator on behalf of a set of one or more parties that desire
5 masks, subsidies for production of masks using said particular technology;
6 paying for manufacture of said masks using compensation that includes said subsidies
7 from said facilitator;
8 causing a set of one or more mask makers to manufacture said masks using said
9 particular technology for said compensation; and
10 receiving, by said facilitator from said set of one or more parties, compensation for
11 said subsidies based on one or more factors including a factor that reflects
12 market success of integrated circuits produced using said masks.

1 29. The method of Claim 28 wherein, for a particular party in said set of one or more
2 parties,
3 the facilitator agrees to provide subsidies for production of masks for a defined
4 population of designs; and
5 the particular party agrees to compensate the facilitator for the subsidies based on a
6 factor that reflects market success of each and every integrated circuit
7 produced by or for said particular party based on any design in said defined
8 population of designs.

1 30. The method of Claim 28 wherein:
2 the masks include a mask for a particular design;
3 manufacture of a mask for said particular design using an alternative technology
4 would cost X;

5 manufacture of the mask for the particular design using said particular technology
6 costs Y, where Y is greater than X; and
7 the step of providing subsidies includes providing a subsidy that is substantially equal
8 to Y-X for manufacture of said mask for said particular design using said
9 particular technology.

1 31. The method of Claim 28 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator based on number of
3 integrated circuits manufactured using a mask that was subsidized by the facilitator.

1 32. The method of Claim 28 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator for rental of a mask
3 that was subsidized by the facilitator.

1 33. The method of Claim 28 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator based on revenues
3 derived from integrated circuits manufactured using a mask that was subsidized by
4 the facilitator.

1 34. The method of Claim 33 wherein the party pays the facilitator a per-unit amount that
2 decreases with increased volume of sales of integrated circuits manufactured using
3 said mask.

1 35. The method of Claim 28 wherein the set of one or more parties includes a plurality of
2 parties.

1 36. The method of Claim 28 wherein the set of one or more mask makers includes a
2 plurality of mask makers.

1 37. The method of Claim 35 wherein the set of one or more mask makers includes a
2 plurality of mask makers.

- 1 38. The method of Claim 28 further comprising the step of the facilitator certifying mask
2 makers that satisfy certain quality criteria.
- 1 39. The method of Claim 28 further comprising the step of the facilitator selecting the
2 one or more mask makers to manufacture said masks.
- 1 40. The method of Claim 28 further comprising the step of the facilitator gathering
2 information about jobs performed by mask makers, wherein said one or more mask
3 makers are selected to manufacture said masks based on said information.
- 1 41. The method of Claim 40 further comprising the step of the facilitator determining
2 which mask makers to certify based on said information.
- 1 42. The method of Claim 40 wherein the information includes information from the mask
2 makers about reticles that they produce.
- 1 43. The method of Claim 42 further comprising the step of the facilitator causing the
2 mask maker to encode information about a particular reticle onto the particular
3 reticle.
- 1 44. The method of Claim 28 further comprising the step of the facilitator performing one
2 or more quality assurance tests on said masks.
- 1 45. The method of Claim 44 wherein the step of performing one or more quality
2 assurance tests is performed for a given mask prior to the facilitator releasing said
3 given mask to be used by a semiconductor manufacturer.
- 1 46. The method of Claim 28 further including the facilitator using a stepper simulation
2 tool to determine which flaws in said masks have to be corrected.
- 1 47. The method of Claim 46 further comprising the steps of:
2 the facilitator providing information about a particular mask acquired through the use
3 of the stepper simulation tool to a semiconductor manufacturer; and
4 the semiconductor manufacturer adjusting parameters on an actual stepper that is used
5 with the particular mask based on the information.

- 1 48. The method of Claim 28 further comprising the step of the facilitator obtaining a
2 volume discount from a mask manufacturer based on a contract in which the
3 facilitator agrees to use the mask manufacturer to produce masks for a plurality of
4 semiconductor manufacturers.
- 1 49. The method of Claim 28 further comprising the step of the facilitator purchasing an
2 option from a mask maker that commits the mask maker to perform a certain volume
3 of future work for the facilitator; and
4 wherein the step of causing a set of one or more mask makers to manufacture said
5 masks includes said facilitator exercising said option.
- 1 50. The method of Claim 28 wherein:
2 the compensation for said subsidies is based on the number of semiconductors
3 produced by said masks; and
4 the method further comprises the steps of using a counter installed on stepper
5 equipment to determine the compensation.
- 1 51. The method of Claim 28 wherein:
2 the compensation for said subsidies is based on the number of semiconductors
3 produced by said masks; and
4 the method further comprises the steps of placing a counter device on at least one of
5 the masks to determine the compensation.
- 1 52. The method of Claim 28 further comprising the step of facilitator causing designs of
2 at least some of the integrated circuits produced using said masks to be watermarked.
- 1 53. A method of manufacturing products using a particular technology when said
2 particular technology is preferable to but cost more than one or more alternative
3 technologies, the method comprising the steps of:
4 providing, from a facilitator on behalf of a set of one or more parties, subsidies for
5 using said particular technology to manufacture products;

paying for manufacture of said products using compensation that includes said subsidies from said facilitator;

causing products to be manufactured for said compensation using said particular technology; and

receiving, by said facilitator from said set of one or more parties, compensation for said subsidies based on one or more factors including a factor that reflects market success of said products.

54. The method of Claim 53 wherein, for a particular party in said set of one or more parties,

the facilitator agrees to provide subsidies for production of products for a defined population of designs; and

the particular party agrees to compensate the facilitator for the subsidies based on a factor that reflects market success of each and every article of manufacture produced by or for said particular party based on any design in said defined population of designs.

55. The method of Claim 53 wherein:

- the products include a product for a particular design;
- manufacture of a product for said particular design using an alternative technology would cost X;
- manufacture of the product for the particular design using said particular technology costs Y, where Y is greater than X; and
- the step of providing subsidies includes providing a subsidy that is substantially equal to Y-X for manufacture of said product for said particular design using said particular technology.

- 1 56. The method of Claim 53 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator based on number of
3 articles of manufacture manufactured using a product that was subsidized by the
4 facilitator.
- 1 57. The method of Claim 53 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator for rental of a product
3 that was subsidized by the facilitator.
- 1 58. The method of Claim 53 wherein the step of compensating the facilitator includes a
2 party from said set of one or more parties paying the facilitator based on revenues
3 derived from articles of manufacture manufactured using a product that was
4 subsidized by the facilitator.
- 1 59. The method of Claim 58 wherein the party pays the facilitator a per-unit amount that
2 decreases with increased volume of sales of articles of manufacture manufactured
3 using said product.
- 1 60. The method of Claim 53 wherein the set of one or more parties includes a plurality of
2 parties.
- 1 61. The method of Claim 53 wherein the set of one or more product makers includes a
2 plurality of product makers.
- 1 62. The method of Claim 60 wherein the set of one or more product makers includes a
2 plurality of product makers.
- 1 63. The method of Claim 53 further comprising the step of the facilitator certifying
2 product makers that satisfy certain quality criteria.
- 1 64. The method of Claim 53 further comprising the step of the facilitator selecting the
2 one or more product makers to manufacture said products.

- 1 65. The method of Claim 53 further comprising the step of the facilitator gathering
2 information about jobs performed by product makers, wherein said one or more
3 product makers are selected to manufacture said products based on said information.
- 1 66. The method of Claim 65 further comprising the step of the facilitator determining
2 which product makers to certify based on said information.
- 1 67. The method of Claim 53 further comprising the step of the facilitator performing one
2 or more quality assurance tests on said products.
- 1 68. The method of Claim 67 wherein the step of performing one or more quality
2 assurance tests is performed for a given product prior to the facilitator releasing said
3 given product to said one or more parties.
- 1 69. The method of Claim 53 further comprising the step of the facilitator obtaining a
2 volume discount from a product manufacturer based on a contract in which the
3 facilitator agrees to use the product manufacturer to produce products for a plurality
4 of said one or more parties.
- 1 70. The method of Claim 53 further comprising the step of the facilitator purchasing an
2 option from a product maker that commits the product maker to perform a certain
3 volume of future work for the facilitator; and
4 wherein the step of causing a set of one or more product makers to manufacture said
5 products includes said facilitator exercising said option.
- 1 71. The method of Claim 53 further comprising the step of facilitator causing designs of
2 at least some of the articles of manufacture produced using said products to be
3 watermarked.